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HIPOTRONICS
INC.
BREWSTER NEW YORK

"High Potential Electronics"

POWER PACK APPLICATION

PRECAUTIONS

These power packs are basic high voltage power supplies. They do not have protection for sustained short circuit current. This protection must be added externally.

Normally, an external fuse should be used in the primary. The rating of the fuse may be determined by multiplying the output voltage by the output current and dividing the product by the input voltage. (115V)

Series resistors are internally used to limit peak rectifier output current. When using the power pack as a spark gap ignitor supply or for capacitor charging, one of two limiting devices can and should be used.

1. An external output resistor in series with the high voltage output to protect the power pack. The resistor should be capable of holding off the full output voltage of the supply. The resistance value should be close to the result of output volts divided by the output current of the supply.

2. Another way of current limiting when charging capacitors is to place a resistance in the primary. Use a standard incandescent lamp. There are many different wattage values available, and by changing the wattage you can change the current limiting value.

When "slapping-on" repeatedly, the input surge must be softened. Normally, these power packs are operated with a variable auto transformer on the input.

1/15/75

HIPOTRONICS, INC.

MODEL NO. R20B
PART NO. 13-352

*** DANGER HIGH VOLTAGE ***

WARNING: The products described in this publication are designed to supply high voltage. Accordingly, maximum safeguards have been built into the equipment and instructions for operation have been prepared in such a manner as to emphasize the best safety techniques possible. Additionally, much effort has been expended to caution the user to exercise care in the use of certain controls and at appropriate points in the operating procedures. Nevertheless, when using this equipment, the user is cautioned to maintain a safety consciousness at all times. In particular, before connecting input power, be sure to ground case. Before ungrounding case, be sure to disconnect input power.

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SCOPE

This publication describes the HIPOTRONICS R Series of Power Supplies. It is intended to provide a simplified reference for users of this equipment, and to allow them to make use of its features quickly, safely, and efficiently.

Information in this publication applies to all eight models in the R Series. Information pertinent to the specific model purchased is provided in the pocket of the back cover of the publication. This includes a diagram of the control panel, an electrical schematic and a parts list.

The publication contains four major sections: General Description, Installation Instructions, Operation Instructions and Special Operations.

The General Description section describes the major features of the models in the R Series and also contains a description of the functions performed by each of the controls and indicators on the control panel.

The Installation Instructions section provides step-by-step instructions for the installation or set-up of the unit.

The Operation Instructions section provides step-by-step instructions for utilizing R Series power supplies.

The Special Operations section describes the procedures involved in Voltmeter Recalibration and Trouble Shooting.

GENERAL DESCRIPTION

This section is intended to acquaint the user with the major features of the models in the Hipotronics R Series Power Supplies, and the functions performed by each of the controls and indicators on the control panel.

Features and Specifications

The Hipotronics R Series Power Supplies consists of eight, fully instrumented high voltage dc power packs with output voltages from 2.5-60 kV.

These compact, highly miniaturized units are designed for long life and trouble free operation. All units are housed in hermetically sealed cans, and are filled with mineral type transformer oil or epoxy.

All models operate from an input of 115 volts ac, 50/60 Hz, 3 Amperes. Features include:

- a single range kV meter
- a single range current meter
- a continuously adjustable output control
- an AC input switch, fuse and pilot light
- a HV fuse with an overload light
- surge and transient protection on all meters
- reversible polarity
- short circuit current limiter

Model No.	KV Meter	Output (KV)	Current Meter (mA)
R2B	0-3	0-2.5	0-5
R5B	0-6	0-5	0-5
R10B	0-12	0-10	0-5
R15B	0-15	0-15	0-5
R20B	0-25	0-20	0-5
R30B	0-30	0-30	0-5
R50B	0-50	0-50	0-5
R60A	0-60	0-60	0-2.5

Figure 1. Specifications of Models in the R Series

Controls and Indicators

A diagram of the control panel for each particular model in the R-Series is contained in the pocket in the back of this publication. This diagram should be referred to when following the installation and operation instructions. The functions and uses of the various controls and indicators are described below.

VOLTMETER

The voltmeter is the left window on the control panel, and measures the dc output voltage as indicated by the label "DC KILOVOLTS" on the scale. The numbers above the meter markings denote the kilovolt output when the ac power is on.

RAISE VOLTAGE

The RAISE VOLTAGE control, located in the center of the control panel, regulates the output voltage.Markings on the RAISE VOLTAGE control denote the percentage of the maximum output.

The user is cautioned to keep the RAISE VOLTAGE control set on "0" when not in use, and to lower the control back to "0" immediately upon completion of the test.

Capacitive loads should be completely discharged before any cables are touched.

CURRENT METER

The current meter is the right window on the control panel and is used to indicate the dc output current from 0-5 milliamperes.

POLARITY SWITCH

The polarity switch, located between the window meters, sets the output meters to the desired POSITIVE or NEGATIVE polarity. The polarity switch must be used in conjunction with the appropriate lead connection on the power supply output.

OVERLOAD

The overload fuse receptacle will glow when the rated current limit is exceeded.

For applications such as capacitor charging, a current limiting lamp can be substituted for the overload fuse by removing the fuse from the front panel therefore placing the lamp in the circuit.

AC POWER CONTROLS

The AC POWER section of the control panel contains a toggle switch (labeled ON at the upper position), a pilot light that glows when the unit is on and a high voltage fuse. The fuse may be accessed for replacement by pressing the cap down and turning it counterclockwise.

INSTALLATION INSTRUCTIONS

This section provides step-by-step instructions for the installation or set-up of the the R-Series power packs.

1. Mount the unit on a standard relay rack by means of the notched front panel placing the meters at eye level to allow for maximum accuracy in readings.

2. Set the RAISE VOLTAGE control to "0" and check to ensure that the AC POWER switch is in the OFF (down) position.

3. Ground the case before connecting the input power.

4. Plug the line cord of the unit into a 115 volt, 50/60 Hz outlet. If a two-prong adapter is used, be sure to ground the third wire.

5. The high voltage lead should be connected to the high side of the load. The ground is connected to the low side.

OPERATION INSTRUCTIONS

This section provides step-by-step instructions for utilizing the R-Series power supplies. Prior to performing any of these functions, the procedures described in the preceding section must be performed.

1. Check the output polarity. The connections at the rear of the unit are labeled according to function on the units up to Model R30B. On Models R30B, R50B and R60A, the rear dust cover must be removed for access to the re-entrant output bushings.

2. Ensure that the high voltage is off.

3. Insert the banana plugs into the correct terminals to achieve the desired negative or positive polarity.

   It is necessary to switch the high voltage and return leads to achieve polarity reversal on Models R30B, R50B and R60A. For example: For negative output, connect the output lead to the NEG terminal and the shorter RTN lead should be connected to the POS output.

4. Set the polarity switch on the front panel to the corresponding polarity.

5. Set the voltage control to zero.

6. Turn the AC power ON.

7. Raise the voltage to the desired level.

8. The high voltage meter and current meter may be monitored as required.

SPECIAL OPERATIONS

This section describes the step-by-step procedures required to perform special operations incidental to the major functions described in the preceding section.

Meter Recalibration

Both meters on the R-Series units have been calibrated with standards traceable to the national standards maintained by the National Bureau of Standards in Washington, D.C. and are certified accurate to within 2% when shipped.

Voltmeter recalibration may be performed by the user on all R-Series models except the R2.5B and the R5B. The frequency of meter recalibration depends on the requirements of each installation, as dictated by usage and by the user's standards for accuracy. Considering these requirements, recalibration depends primarily on three factors: amount of physical handling, time lapse, and extent of meter usage. Intervals between meter recalibration may vary anywhere between one month and one year.

The process of voltmeter recalibration consists of two separate operations to be performed in the sequence described:

1. Set-up Procedures
2. Voltmeter Calibration - DC

A diagram of the printed circuit board, illustrating the location of the calibration potentiometers (pots), is contained in the back pocket of this publication.

SET-UP PROCEDURES

1. Remove the unit from the relay rack or cabinet.

2. Select a location for the unit that will place the meters at eye level to allow for maximum accuracy in readings.

3. Set the RAISE VOLTAGE Control to "0", and check to ensure that the AC POWER switch is in OFF (down) position.

4. Ground the case before connecting the input power. A Ground Post on the back is used for this purpose.

5. Remove the dust cover that protects the top and the rear of the unit by removing three machine screws from each side of the chassis (two on top, one in rear).

6. Plug the line cord of the unit into a 115 volt, 50/60 Hz outlet. If a two prong adapter is used, be sure to ground the third wire.

7. Turn the AC POWER switch ON (up position).

VOLTMETER CALIBRATION - DC

1. Ensure that the unit is properly grounded and that the RAISE VOLTAGE control is set to "0".

2. Select a calibrated external voltmeter with meter range and polarity appropriate for the unit to be calibrated.

3. Connect the high voltage lead to the high side of the standard meter.

4. Connect the low side of the external voltmeter to ground.

5. Increase the output voltage via the RAISE VOLTAGE control until the external voltmeter reading is equivalent to approximately two-thirds of the scale of the meter to be calibrated (unit meter).

6. Check the reading on the unit meter.

7. Adjust the unit meter as necessary via the calibration pot labeled "DC" on the printed circuit board (see diagram) until the meter reading equals the reading on the external meter.

Trouble-Shooting

All products shipped by Hipotronics are thoroughly tested against a rigid set of standards by the firm's Quality Control Department. In the event a unit appears not to function upon delivery, the user is referred to the section, "Returned Material."

This section of the publication is intended to aid the user in locating the source of a problem when a unit is either not functioning or functioning improperly.

Use of these procedures is at the user's own risk. It is not recommended that these procedures be used while the equipment is under Warranty, as some of the recommended steps involve the removal, testing or disconnecting of components, which could result in voiding the Warranty.

These procedures are intended for use only by a trained repair technician, and are not recommended for use by individuals trained only to operate the equipment, except under strict supervision.

An attempt has been made to provide information to aid the user in trouble-shooting those problems that are most commonly encountered, either as a result of normal wear and tear or direct damage to the unit. Trouble-shooting procedures are described in tabular form on the following page for ease in reference. Procedures are listed according to problem area. Possible causes of each problem are listed, along with appropriate remedial action for each case.

PROBLEM	POSSIBLE CAUSE	RECOMMENDED SOLUTION
No High Voltage Output	a. Damaged T1 variable autotransformer	a. Check the output of the component against a standard voltmeter; replace variac if necessary
	b. Defective current limiting lamp or overload fuse missing	b. Replace the lamp or the fuse depending on application
Incorrect Current Meter Reading	a. Defective C2 Capacitor	a. Replace the capacitor
	b. Incorrect R3 value	b. Replace with appropriate resistor

HIPOTRONICS

Exhibit A
SOP # 652

WARRANTY

HIPOTRONICS, INC. warrants to the original purchaser of any new merchandise that the merchandise is free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of shipment. The obligation of Hipotronics, Inc. under this Warranty is limited, in its exclusive option, to repair, replace or issue credit for parts or materials which prove to be defective, and is subject to Purchaser's compliance with the Hipotronics, Inc. Warranty Claim Procedure as set forth below. The happening of any one or more of the following events will serve to void this Warranty and any defect or damage resulting therefrom is specifically excluded from Warranty coverage: (a) defects due to accident, negligence, alteration, modification, faulty installation by Purchaser or Purchaser's agents or employees, abuse or misuse; (b) attempted or actual dismantling, disassembling, service or repair by any person, firm or corporation not specifically authorized in writing by Hipotronics, Inc. (c) defects caused by or due to handling by carrier, or incurred during shipment, transshipment or other move.

This Warranty covers only those parts and/or materials deemed by Hipotronics, Inc. to be defective within the meaning of this Warranty. The liability of Hipotronics, Inc. shall be limited to the repair, replacement or issuance of credit for parts deemed defective within the meaning of this Warranty. Costs incurred by purchaser for labor or other expenses incidental to the inspection, repair, replacement or issuance of credit for such parts and/or material shall be the sole responsibility of purchaser. This Warranty shall not apply to any accessories, parts, or materials not manufactured or supplied by Hipotronics, Inc. and if, in the sole discretion of Hipotronics, Inc., Purchaser's claim relates to any materials or workmanship manufactured or performed by the supplier of a component part, or of the manufacturer of a device of which the defective part is a component, Hipotronics, Inc. reserves the right to disclaim liability under this Warranty and to direct that the Purchaser deal directly with such supplier or manufacturer. Hipotronics, Inc. agrees to assist the Purchaser in processing or settling any such claim without prejudicing its position as to liability.

WARRANTY CLAIM PROCEDURE Compliance with the following Warranty Claim Procedure is a condition precedent to the obligation of Hipotronics, Inc. under this Warranty:

(a) Purchaser must notify Hipotronics, Inc. in writing by certified or registered mail, of the defect claimed within twelve (12) months after date of original shipment. Said notice

WARRANTY

WARRANTY CLAIM PROCEDURE (cont'd)

shall describe in detail the defect, the defective part, and the alleged cause of defect; (b) at the exclusive option of Hipotronics, Inc., Purchaser shall dismantle or disassemble at Purchaser's cost and expense and shall ship the defective part or material prepaid to Hipotronics, Inc., Brewster, New York 10509, for inspection, or permit an authorized service representative of Hipotronics, Inc. to inspect the defective part or material at Purchaser's premises. If Hipotronics, Inc. shall inspect the part or material at the Purchaser's premises, Purchaser shall provide facilities for, and at Purchaser's cost and expense, dismantle, disassemble, or otherwise make accessible the subject part or material whether or not same is a component of or installed in a device other than that manufactured or supplied by Hipotronics, Inc. If disclosure shows that the defect is not one for which Hipotronics, Inc. is liable, the Purchaser agrees to reimburse Hipotronics, Inc. for all expense incurred; (c) upon receipt of the defective part or material, or after access to same, Hipotronics, Inc. shall inspect the part or material to determine the validity of Purchaser's claim.

The validity of any Warranty Claim, Purchaser's compliance with Hipotronics, Inc. Warranty Claim Procedure, the obligation to either repair, replace, or issue credit, or direct the purchaser to deal directly with a manufacturer or supplier are to be determined solely and exclusively by Hipotronics, Inc. and any determination so made shall be final and binding.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED ON THE PART OF HIPOTRONICS, INC., INCLUDING THE WARRANTIES OF MERCHANTIBILITY AND FITNESS FOR USE, AND CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH THEREOF AND HIPOTRONICS, INC. NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME ANY LIABILITY OR OBLIGATION IN CONNECTION WITH THIS SALE ON ITS BEHALF AND PURCHASER ACKNOWLEDGES THAT NO REPRESENTATIONS EXCEPT THOSE MADE HEREIN HAVE BEEN MADE TO PURCHASER.

9/17/71

RETURNED MATERIAL

If, for any reason, it should become necessary to return the equipment described in this publication to the factory, the Warranty Service Department of HIPOTRONICS must be contacted, at which time the following data must be given in order that we may identify the unit and determine the necessity for return. [Tel. (914) 279-8035] MODEL, SERIAL NO. and TYPE (Part No.) is indicated on the black and silver tag affixed to the unit.

MODEL:
SERIAL NUMBER:
TYPE (Part No.):
REASON FOR RETURN:
DEFECT:
ALLEGED CAUSE OF DEFECT:

If HIPOTRONICS deems return of the unit appropriate, an "Authorization for Return" tag will be issued. This will instruct you as to the method of return. The pink copy is for your records, the hard copy to be affixed to the unit being returned. If return is not deemed advisable, other inspection arrangements will be made.

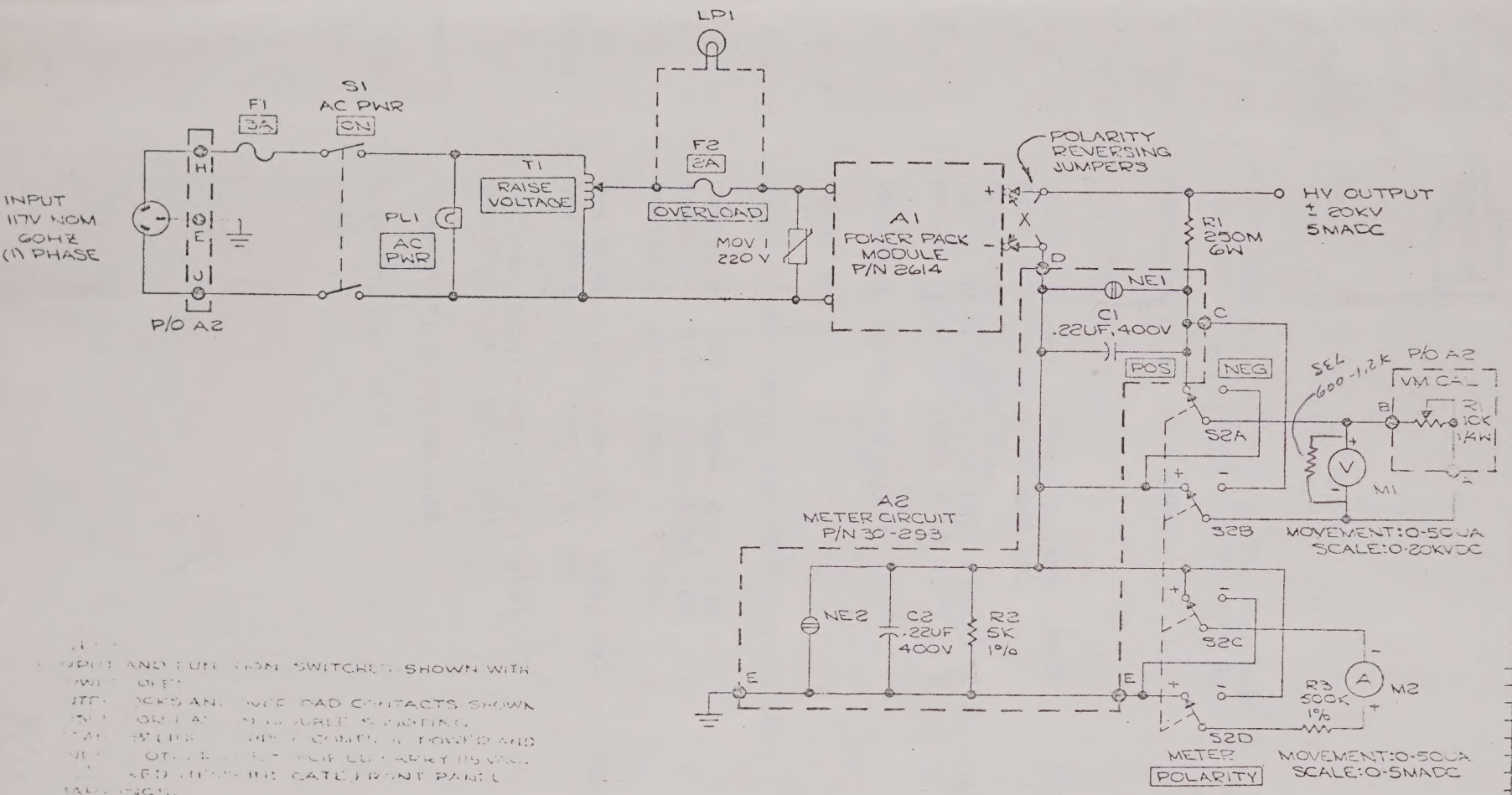
NOTE: Material received at this plant without the proper authorization shall be held as "customer's property," with no service performed until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service. Thank you.

PARTS ORDERING

To order replacement parts for this unit, please refer to the Parts List contained in the pocket of this publication. The number of the specific component is required, along with the TYPE (Part No.) of the unit. The TYPE (Part No.) is indicated on your Parts List, and on the black and silver tag affixed to the unit.

ZONE	LTR	DESCRIPTION	E.C. NO.	DATE	APPROVED
	E	REDRAWN		10-30-70	
	F	ADDED MOV 1, 220V	37-0360	2-7-71	



NOTES:

1. INPUT AND FUNCTION SWITCHES SHOWN WITH POWER OFF.
2. CONNECTORS AND MATE LEAD CONTACTS SHOWN ARE ON A2 UNLESS NOTED OTHERWISE.
3. A2 BOARD COMPONENTS POWERED AND TESTED AT FACTORY WITH 115 VAC.
4. LABELED ON FRONT PANEL AS INDICATED.
5.) DENOTES P/O A2 BOARD CONNECTIONS.
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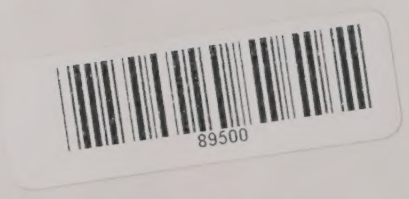
HIPOTRONICS

PARTS LIST

MODEL NO. R20B
PART NO. 13-352

A1	Subassembly, 20 kV dc ± Supply, Hipo P/N 2614
A2	Subassembly, Printed Circuit P/N 30-293
A2C1,2	Capacitor, .22 uF @ 400 V
Chassis	P/N 13-363
F1	Fuse, 3A, 3AG in Buss Holder HKP-CC
F2	Fuse, 2 A in Buss Holder HKL
LP1	Lamp, 100 W, 115 V ac
M1	Meter, 0-50 uA Ideal 4500 w/0-20 kV dc scale
M2	Meter, 0-50 uA Ideal 4500 w0-5 mA dc scale
MOV	Movistor 220 V, VP250LA40
NE1-2	Neon, NE2
PL1	Pilot Light, Drake 5100-832 w/NE51H bulb
R1	Resistor, 250 M ohms, 6 W, 15%
R2	Resistor, 270 k ohms, ½ W, 10%
R3	Resistor, 500 k ohms, ½ W, 1%
A2R1	Resistor, 10 k ohms, ¼ W, Pot, Mallory MTC L1-10K
A2R2	Resistor, 5 k ohms, ½ W, 1%
S1	Switch, Toggle DPST C-H 7561K4
S2	Switch Rotary, DP4T, CRL
T1	Powerstat, Superior 10B
SCH	Part No. CS13-352

WIL CAL LAB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